

CLAIMS

What is claimed is:

1. A method for purifying target molecules from a primer extension sequencing reaction using a purification device comprising the following steps:
 - 5 (a) introducing the primer extension sequencing reaction mixture into a purification device comprising an electrophoretic medium containing immobilized capture probes, wherein the immobilized capture probes are selected from the group consisting of nucleic acids, modified nucleic acids and nucleic acid analogs;
 - 10 (b) subjecting the electrophoretic medium of step (a) to an electric field resulting in the electrophoretic migration of one, or more, target molecules into at least one region of the electrophoretic medium containing immobilized capture probes, wherein the target molecules bind to the immobilized capture probes and non-target molecules continue to migrate under the influence of the electric field, thereby separating the target molecules from the non-target molecules of the primer extension sequencing reaction mixture;
 - 15 (c) imposing conditions on the electrophoretic medium that dissociate the targets and their complementary capture probes;
 - 20 (d) applying an electric field while maintaining the dissociating conditions within the electrophoretic medium, thereby causing the dissociated target molecules to exit the electrophoretic medium by electrophoretic migration; and
 - 25 (e) collecting the target molecules which have exited the electrophoretic medium.
2. The method of Claim 1, wherein the purification device is a microtiter plate.

3. The method of Claim 2, wherein the microtiter plate comprises multiple wells.
4. The method of Claim 3, wherein the number of wells contained within the microtiter plate is selected from the group consisting of: 6, 12, 48, 96 and 384.
5. The method of Claim 1 wherein in step (c), a sufficient voltage is applied to release the target molecule from its complementary capture probe, and wherein the target molecule continues electrophoretic migration under the influence of an electric field and exits the electrophoretic medium, and wherein it collects in a collecting chamber.
6. The method of Claim 5, wherein the polarity of the electric field is reversed, wherein the released target molecule will migrate back toward the test sample receptacle and wherein it is subject to collection.
7. The method of Claim 1, wherein the capture probe is a nucleic acid molecule.
8. The method of Claim 7, wherein the capture probe is complementary to the primer extension sequencing product.
9. The method of Claim 8, wherein the capture probe is from about 20 to about 2000 nucleotides in length.
10. A method for purifying multiple sets of primer extension sequencing reaction products which are formed by synthesizing multiple sets of primer extension sequencing reaction products comprising the following steps:
 - (a) introducing the multiple sets of primer extension sequencing reaction products into a purification device comprising at least two cartridges,

wherein each cartridge comprises an electrophoretic medium containing at least one unique set of immobilized capture probes, and wherein the immobilized capture probes are selected from the group consisting of nucleic acids, modified nucleic acids and nucleic acid analogs;

- 5 (b) subjecting the electrophoretic media of step (a) to an electric field resulting in the electrophoretic migration of one, or more, sets of primer extension sequencing reaction products into the cartridges of step (a), wherein target molecules in each set of primer extension sequencing reaction products bind to a substantially complimentary set of
- 10 immobilized capture probes and non-target molecules continue to migrate under the influence of the electric field, thereby separating the target molecules from the non-target molecules in each set of the primer extension sequencing reaction products;
- (c) imposing conditions on the electrophoretic medium that dissociate the
- 15 target molecules and their complementary capture probes;
- (d) applying an electric field while maintaining the dissociating conditions within the electrophoretic medium, thereby causing the dissociated target molecules to exit the electrophoretic medium by electrophoretic migration; and
- 20 (e) collecting each set of primer extension sequencing reaction target molecules which exit the electrophoretic medium.

11. The method of Claim 10, wherein the purification device is a microtiter plate.

12. The method of Claim 11, wherein the microtiter plate comprises multiple wells.

13. The method of Claim 12, wherein the number wells contained within the

25 microtiter plate is selected from the group consisting of: 6, 12, 48, 96 and 384.

14. The method of Claim 10 wherein in step (c), a sufficient voltage is applied to release the target molecule from its complementary capture probe, and wherein the target molecule continues electrophoretic migration under the influence of an electric field and exits the electrophoretic medium, and wherein it collects in a collecting chamber.
15. The method of Claim 14, wherein the polarity of the electric field is reversed, wherein the released target molecule will migrate back toward the test sample receptacle and wherein it is subject to collection.
16. The method of Claim 10, wherein the capture probe is a nucleic acid molecule.
17. The method of Claim 17, wherein the capture probe is complementary to the primer extension sequencing product.
18. The method of Claim 17, wherein the capture probe is from about 20 to about 2000 nucleotides in length.
19. A method for purifying target molecules from a primer extension sequencing reaction using a purification device comprising the following steps:
- (a) introducing the primer extension sequencing reaction mixture into a purification device comprising an electrophoretic medium containing capture probes modified with a 5'-acrylamide moiety and selected from the group consisting of nucleic acids, modified nucleic acids and nucleic acid analogs, wherein the capture probes are immobilized in the electrophoretic medium by a covalent bond between the 5'-acrylamide moiety and the electrophoretic medium;
 - (b) subjecting the electrophoretic medium of step (a) to an electric field resulting in the electrophoretic migration of one, or more, target

molecules into at least one region of the electrophoretic medium containing immobilized capture probes, wherein the target molecules bind to the immobilized capture probes and non-target molecules continue to migrate under the influence of the electric field, thereby separating the target molecules from the non-target molecules of the primer extension sequencing reaction mixture;

- (c) imposing conditions on the electrophoretic medium that dissociate the targets and their complementary capture probes;
- (d) applying an electric field while maintaining the dissociating conditions within the electrophoretic medium, thereby causing the dissociated target molecules to exit the electrophoretic medium by electrophoretic migration; and
- (e) collecting the target molecules which have exited the electrophoretic medium.

- 15 20. The method of Claim 19, wherein the capture probes are immobilized in the electrophoretic medium by copolymerizing the 5'-acrylamide moiety with the electrophoretic medium.